PSet 4: **Traveling Waves**

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1 The wave model

(a) What is a traveling wave?

(b) What is the main requirement in order for a traveling wave to propagate?

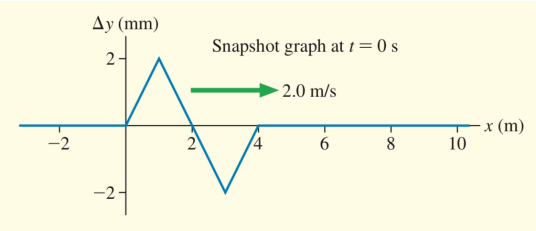
(c) Describe the difference between a transverse and a longitudinal wave.

(d) How do we define a wave's velocity? What does it depend upon?

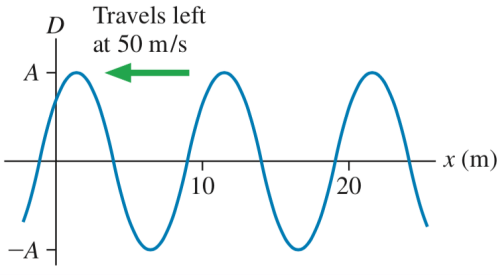
(e) Is wavelength of a wave a property of the medium or the source? What about frequency? Explain.

2 History and snapshop graphs

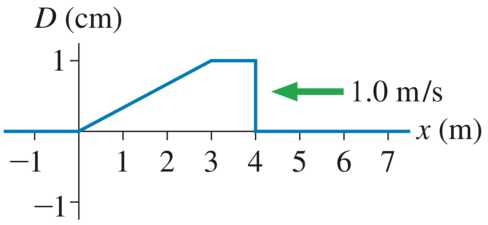
(a) Below is a snapshot graph at $t = 0$ sec for a wave moving to the right at a speed of 2.0 m/s. Draw a history graph for the position $x = 8.0$ m.



(b) What is the frequency of the traveling wave below?



(c) Draw the history graph $D(x = 0 \text{ m}, t)$ for the wave shown below.



Snapshot graph of a wave at $t = 0$ s

3 Sinusoidal traveling waves

A very long string with $\mu = 2.0$ g/m is streched along the x-axis with a tension of 5.0 N. At $x = 0$ m, it is tied to a 100 Hz simple harmonic oscillator that vibrates perpendicular to the string with an amplitude of 2.0 mm. The oscillator is at maximum displacement initially.

(a) Write the displacement equation for the traveling wave on a string

(b) At $t = 5.0$ ms, what is the string's displacement at a point 2.7 m from the oscillator?